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COMMENTARY

[Commentary is a section of *Quaest. Ent.*that appears from time to time, and contains expressions of opinions about general items, controversial or otherwise, that ought to be of interest to many of our readers. These contributions are not refereed because they are intended to be free expressions of opinion. Changes by the Editor might be made to the form of presentation, but not to its substance. Remarks that are deliberately abusive or insulting will not be published. Rebuttals to previously expressed views will be considered, but the journal is under no obligation to publish them.

The Editor]

Linear, longitudinal markings on the outer elytral surface of beetles: interneurs or striae?

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The reasons given for the substitution of the neologism "interneur" for "stria", when used as a collective noun in English, are examined. They are based on a *non sequitur*, a mistaken idea that use of "interneur" solves an important problem that "stria" does not, and on the oversight that "interneur" requires redefinition to make it fully synonymous with "stria". The physical basis, homologies, and non-homology of striae are outlined. It is recommended that "interneur" be abandoned; it is an unsuitable replacement for the old and universally familiar "stria".

Only Erwin (1974) appears to have responded to Spilman's (1971) examination of the word "stria" as used in discussions and descriptions of the elytra of beetles. Spilman recommends that the longitudinal, linearly-impressed markings, such as grooves, rows of puncta, and related sculptural forms collectively be called "*elytral striae*". As Erwin is aware, major taxonomists writing in English, including among others G. H. Horn, Andrewes, Casey, Jeannel, Lindroth, and Darlington have all, at some point, found it convenient to use "stria(e)" in the collective sense of "elytral stria(e)", as well as in the structural sense. None subsequently appears to have been misled by their and other's double usage of "stria". In what follows, "*stria(e)" will be used to designate and shorten repeated use of "elytral stria(e)" and its grammatical derivatives.

Spilman points out that an alternative to his suggestion would be coinage of a new collective term, but he does not advocate doing so. Nevertheless, Erwin has proposed the new generic term "interneur" to encompass the various forms taken by elytral striae. His grounds for advancing that neologism lack force; as will be pointed out, "interneur" has a disadvantage that *stria does not. Even so, "interneur" is now widely used among an important North American school of workers on Carabidae, of which Erwin is an influential member, as well as by a few describing other forms of Coleoptera. As "interneur" has

strongly been urged upon others, as I have been told, this discussion may serve as a useful retardant to its acceptance and continued use.

The following questions awakened by Erwin's (1974; pp. 3-5) justifications of "interneur" will be discussed: 1) Is the argument sound that stria "... should have a name equivalent to 'interval'"? 2) Does "interneur" serve any special purpose that "*stria" does not? 3) Is "interneur" handicapped in any way that "*stria" is not? 4) What in fact do most *striae and interneurs represent?

1) Should *striae have a name equivalent to "interval"?

Erwin's argument that a new name is *needed* for *stria maintains that "If the intervals are the derived character state of the wing veins of the primitive beetle wing, and if the structures between the intervals are the derived character state of the wing 'cells' or membranes, then the latter [!] should have a name equivalent to 'interval'." Although "interneur" may provide a pleasing counterpart to "interval", the argument is a *non sequitur*. Assuredly no such nomenclatural necessity would arise even were those suppositions proven correct (see section 4), or were all intervals separated by phyletically equivalent structures (which they are not; see section 3). Furthermore, the "structures" in question are of course already named.

For nearly two centuries they have been called "striae" by coleopterists, a misfortune as Erwin sees it. He states that " ... coleopterists have used 'stria' for this structure since a 'stria' (in its proper definition) on a beetle elytron is common to most coleopterous families and thus to most coleopterists [*sic*!]. When the unnamed elytral structure described above [in the "syllogism"] is a serial row of unconnected punctures some coleopterists retain the term 'stria' as a structural name, rather than a descriptive name. Therein lies the problem."

That "problem", in the past and present, has caused little if any difficulty for most coleopterists. As with such nouns as "man", context readily indicates whether "stria" is in use as a collective or as a specific noun. In any case, *if* a change in nomenclature is to be made, Spilman's (1971) specific proposal that "*elytral stria*" be used as a collective noun is an alternative that avoids all assumptions and is senior to "interneur".

2) Does "interneur" serve any special purpose that "*stria" does not?

As the main reason for proposing "interneur", Erwin contends that "One cannot state 'stria 7 absent' without meaning the plesiomorphic elytral structure was indeed a stria ...", namely "an impressed line or furrow". Assuredly that is not so; "*stria 7 absent" (just as does "interneur 7 absent") implies *only* that in the presumed plesiomorphic state the external surface of the elytron displays a linear structural marking of some *unspecified* sort. When it is desired " ... to make ... descriptions comparative within a broad taxonomic framework" and " ... to take into account evolutionary changes within taxa ...", then of course the physical nature of the plesiomorphic elytral marking must be specifically stated for interneur and *stria alike. In this respect, each term is without specific meaning, and synonymous.

An analogy: shall a new term be coined to encompass the varied forms of pronotal hind angles, say, to avoid a fancied implication that the plesiomorphic state was in fact a true angle (and not rounded off at its apex) when it is stated, as Lindroth (1966; p. 158) does, "Prothorax without trace of hind angles"? To do so would be to give an illusory solution to an illusory problem.

3) Are the terms "*stria" and "interneur" equally applicable?

*Striae are certain longitudinal modifications of elytral structure, and the term "*stria" is defined and may be used without a stated or implied evolutionary overtone. "Interneur", on the contrary, properly refers to a structure that is

presumed to be "the derived character state of wing 'cells' or membranes", that lay between veins of the primitive beetle wing. Here then *is* a problem: the actual number of *striae may significantly exceed the possible number of interneurs marking the elytra of a fair number of not-primitive, living carabids.

Nine or ten *striae (possible interneurs) on an elytron is the probable modal number for beetles today, including carabids. How then are the five (some *Omophron* with 15 striae) to eight (some *Scaphinotus* with 18) extra sculptured elytral lineations[1] to be referred to under Erwin's proposal? It can be done only by altering the evolutionary definition and meaning of "interneur" to complete synonymy with *stria.

It has been shown by Kolbe (1886, 1893), Bonsdorff (1890), Ganglbauer (1909), Jeannel (e.g., 1925, 1940), and others that the extra impressed lineations are supernumerary formations that subdivide particular not-tracheated intervals, hence are not primitive. No problem arises by denoting these extras as "secondary", "tertiary", *etc.* *striae, as is done. However, "interneur" does not accept such modification without loss of consistency and meaning, for interneurs are characterized as sharing a primary homology (owing to their supposed origins). So far as the interneur concept is concerned, supernumerary *striae must represent one or more classes of unnamed structures.

4) What in fact do *striae and interneurs represent?[2]

Surface expressions of aligned trabeculae (= columnae, columellae) is the answer. Apart from the margins where the upper and lower lamellae of the elytron meet, the elytron is strengthened within and, unlike a flight wing, its two lamellae are held apart by more or less vertical skeletal pillars - the trabeculae. The haemocoel of the elytron is continuous through the interspaces between trabeculae, and is therefore much larger in volume than is that of the hind wing which remains confined to sinuses enclosed within certain veins (see Arnold, 1964).

When *striae are counted and their lengths measured, the *minimal* number and *least* lengths of the underlying longitudinal rows of trabeculae of an elytron have been estimated. This can be confirmed by examination of the inner surface of an elytron where the bases of the trabeculae ("endoreticulum" of Smrz, 1982) are ordinarily visible through the relatively thin surface of the lower lamella[1,3], a fact known since at least the observations of Heer (1847) and Erichson (1848). As trabeculae are not structures unique either to elytra or to Coleoptera (Weber, 1933), and may occupy sites scattered about an elytron (see below), they are very likely *not* homologous with structures of a flight wing above the level of specialized hypodermal cell products and not specifically with the sclerotized outer walls of wing veins.

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[1]Or the 21 or 22 *striae on an elytron of the fossil *Calosoma heeri* Scudder, referred to by Ganglbauer (1909) in his analysis of supernumerary striae. Jeannel (1940) holds the elytron to be that of a carabid on the testimony of Lapouge who examined the specimen, but not a species of *Calosoma*. Supernumerary striae are not limited to Adephaga. I count 14 striae (thus 15 intervals) on the elytra of several species of *Eleodes* (Tenebrionidae). That count would have proved extremely difficult without examination of the aligned bases of the trabeculae on the elytral undersurface.

[2]The general statements of this and section 4 hold for the great majority of beetles, but not necessarily all.

[3]The presence or absence of lines of trabeculae visible on the undersurface of an elytron, so easily examined, in certain cases should make determination of the abbreviation or absence of lineations on the upper surface as plesio- or apomorphies a simple matter. If, for brevity's sake, a single word be desired for aligned trabeculae, *substria(e)* should do satisfactorily.